

Claims

- [c1] 1. An optical sensor package comprising:
a substrate having a first surface in which a cavity is defined, a second surface opposite the first surface, and a wall between the cavity and the second surface, at least a portion of the substrate being formed of silicon;
a membrane bonded to the substrate and spanning the cavity in the substrate;
an optical sensing element on the membrane; and
a window at the second surface for enabling infrared radiation to pass through the wall of the substrate to the optical sensing element, the wall allowing only radiation of wavelengths longer than 1.1 micrometers to pass therethrough to the optical sensing element.
- [c2] 2. The optical sensor package according to claim 1, wherein the optical sensing element is a thermopile.
- [c3] 3. The optical sensor package according to claim 1, further comprising integrated circuitry on the substrate, the integrated circuitry performing logic functions and signal processing for the optical sensing element.
- [c4] 4. The optical sensor package according to claim 3,

wherein the integrated circuitry is between the membrane and the substrate.

- [c5] 5. The optical sensor package according to claim 1, wherein the substrate and the wall are defined by a monocrystallographic silicon chip.
- [c6] 6. The optical sensor package according to claim 1, further comprising a filtering material at the second surface of the substrate.
- [c7] 7. The optical sensor package according to claim 6, wherein the filtering material is implanted in the second surface of the substrate.
- [c8] 8. The optical sensor package according to claim 6, wherein the filtering material is epitaxially grown on the second surface of the substrate.
- [c9] 9. The optical sensor package according to claim 6, wherein the filtering material is a first chip that constitutes a first portion of the substrate, the cavity is defined in a silicon chip that constitutes a second portion of the substrate, and the first and silicon chips are bonded together to form the substrate.
- [c10] 10. The optical sensor package according to claim 6, wherein the filtering material is chosen from the group

consisting of germanium, PbS, InAs, and PbTe.

- [c11] 11. The optical sensor package according to claim 1, further comprising an antireflection coating on the second surface of the substrate, the antireflection coating minimizing reflection of infrared radiation by the substrate.
- [c12] 12. The optical sensor package according to claim 11, wherein the window comprises a coating on the antireflection coating, the coating being substantially opaque to infrared radiation and having an opening aligned with the wall of the substrate and the optical sensing element on the membrane.
- [c13] 13. The optical sensor package according to claim 1, further comprising a capping chip secured to the substrate and enclosing the membrane.
- [c14] 14. An infrared sensor package comprising:
 - a substrate having a first surface in which a cavity is defined, a second surface opposite the first surface, and a wall defined by and between the cavity and the second surface, at least a portion of the substrate being formed of silicon;
 - a membrane bonded to the substrate and spanning the cavity in the substrate;

a thermopile sensing element on the membrane; and integrated circuitry on the substrate, the integrated circuitry performing logic functions and signal processing for the thermopile sensing element;
a window at the second surface for enabling infrared radiation to pass through the wall of the substrate to the thermopile sensing element.

[c15] 15. The infrared sensor package according to claim 14, wherein the wall is defined by the silicon portion of the substrate.

[c16] 16. The infrared sensor package according to claim 14, wherein the substrate and the wall are defined by a monocrystallographic silicon chip.

[c17] 17. The infrared sensor package according to claim 14, further comprising a filtering material implanted in the second surface of the substrate.

[c18] 18. The infrared sensor package according to claim 14, further comprising a filtering material epitaxially grown on the second surface of the substrate.

[c19] 19. The infrared sensor package according to claim 14, wherein the substrate comprises a first chip of a filtering material bonded to a silicon chip in which the cavity is defined.

[c20] 20. The infrared sensor package according to claim 14, further comprising a capping chip secured to the substrate and defining a cavity that encloses the membrane.